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HONEYSUCKLE APHID SPREAD
AND DAMAGE EVALUATION FOR 1986

SOUTH DAKOTA
DEPARTMENT OF AGRICULTURE
DIVISION OF FORESTRY

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ABSTRACT

During 1986 foresters for the South Dakota Division of Forestry conducted a detection survey for the honeysuckle aphid in those six counties where it had not yet been seen. By spring the insect was found in two new counties, Custer and Perkins. By the end of summer the aphid was also found in Fall River county. This leaves only Butte, Harding and Shannon counties where the aphid has not yet been reported.

Also during the winter of 1986, the division continued monitoring aphid damage on the established shelterbelt plots set up during 1984 and 1985. The amount of infestation, both on individual bushes and to the number of bushes in a row, continued to increase. However, younger and middle aged belts still continued height growth. Very few bushes are exhibiting overall dieback or mortality. For the most part the effectiveness of the honeysuckle rows in those shelterbelts being monitored has not been affected by the aphid infestation. The main damage to this point in time has been to the appearance or aesthetics of the bushes. Only time and continued monitoring will tell if the aphid will cause more serious damage or completely destroy the honeysuckle component of existing shelterbelts.

INTRODUCTION

The honeysuckle aphid (Hyadaphis tartaricae) has been in South Dakota for 5 years. It was found in 1981 in three counties on the eastern edge of the state. By the end of 1985 the aphid had been found in 60 of the state's 66 counties (2,3). The only counties where it had not yet been seen were those in the northwestern and southwestern corners of the state.

The aphid itself does not have a unique description. The adults are fairly small, less than 1/2 inch long, with a color ranging from cream to pale green (4). There may be winged or unwinged forms, males may or may not be present, reproducing females may lay eggs or bear live young. At the same time there will probably be several different larval instars (5). The eggs overwinter and hatch about the same time honeysuckle plants begin to break bud. Usually the first few generations in any infestation are wingless females which bear live young. A complete new generation can occur every 7 to 14 days. Young of later generations develop wings and fly off to start new colonies. Winged males start showing up in early fall and females soon start laying eggs which overwinter (4). All of these stages will usually overlap.

What is very distinguishing is the damage they cause to the honeysuckle plants. The aphid is basically a sapsucker, pulling juices from the succulent stems and buds in early spring, then later moving to the leaves. Aphids feeding on the upper leaf surfaces near the terminals cause the plant to do two things. First, there is a proliferation of weak side shoots, resulting in a witches broom effect. Further, their feeding on the leaves causes the leaf to fold upward along the mid-vein, thus protecting the aphids inside where the aphids continue sucking out the plant sap. These folded leaves and witches brooms tend to die and turn brown in early fall, then remain on the plants through the winter giving the bushes a very unsightly appearance (4).

The severity of the damage depends on several factors. Boisvert et. al. (1) indicate that certain Lonicera species and cultures are resistant to the aphid. Also, damage may be dependent on the number of years of infestation. Reports indicate that the first year a few terminals may be infested, the second year about half of the terminals are infested, and by the third year most, if not all, terminals are infested and dieback is evident. The dieback supposedly continues until the plant dies between the third and fifth year. These reports are primarily from those states first infested with the aphid. No one really knows what will happen in South Dakota. This survey and evaluation had two purposes. The first was to survey the remaining uninfested counties for new infestations. The second purpose was to reevaluate the damage plots set up in 1984 and 1985, compare the damage against prior years' evaluations and, if possible, arrive at some prediction of how much damage South Dakota can expect from this pest.

METHODS

Part I: Detection Survey

District personnel spent several hours in each county where aphids had not yet been seen. Basically this time was spent driving through areas likely to have honeysuckle plants. The characteristic witches brooms on infested bushes could generally be seen from the road. Questionable damage was checked for aphids or cast skins. Along with an actual search for aphids and aphid damage, district

foresters also reported any new infestations throughout the summer and fall. Once found anywhere in the county the entire county was considered infested.

Part II. Damage Evaluation

The plots set up in 1984 and 1985 were reevaluated using the same criteria and methods as those used in the 1984 evaluation (2). Plots were evaluated between January 1 and April 2, 1986, essentially after leaf drop and before budbreak. One plot was not evaluated until May 27 in order to determine if it was easier to do the evaluations after spring foliation. Each bush was individually rated for percentage of terminals infested and put into one of four groups; 0%, 1-25%, 25-75%, 25-75%, or >75%. The entire belt was measured for height and placed into a damage class based on the following tables:

<u>Damage Class</u>	<u>Description</u>
1	Only a few (<25%) scattered terminals infested.
2	Infested terminals through row (25-75%) but no heavy dieback.
3	Most terminals (>75%) infested but bushes otherwise appear in good health.
4	Some bushes suffering obvious decline and dieback but none dead.
5	Many bushes in decline but none dead.
6	Some bushes killed (<25%), the rest healthy or in class 1, 2, or 3.
7	Some bushes killed (<25%), the rest as in class 4 or 5.

8 Numerous bushes dead (25-75%), the rest
 with a lot of dieback or decline.

9 Most (>75%) bushes killed.

(Decline or dieback is defined as several stems obviously being killed beyond the witches broom, little if any overall growth occurring. The living portion of the bush is getting smaller, not larger.)

The data was then compared against the same data collected during the 1984 and 1985 evaluations.

RESULTS

Part I: Detection Survey

The honeysuckle aphid was found in three new counties during 1986, Perkins, Custer, and Fall River. The aphid was found in Custer and Perkins in early spring while it took until the end of summer to find it in Fall River. Figure 1 shows all the infested counties in the state by year an infestation was first found. Only three counties, Harding, Butte, and Shannon, remain where infestations have not yet been seen or reported.

Part II: Damage Evaluation

Tables 1, 2, and 3 exhibit the data collected from 1984, 1985, and 1986 respectively. Unfortunately due to time limitations two belts, Douglas 1 and 2, could not be remeasured in 1986. Table 4 shows the differences between measurements taken this year and those taken in 1985. The difference between this year's, 1986, and the original measurements taken in 1984, is shown in Table 5. Average

measurements for all three years can be compared in Table 6. Briefly those tables show that after 3 years only one belt, Sioux Falls, has evidence of some decline and dieback. Surprisingly, in two belts, Pierre and Yankton, the infestation severity actually decreased. Infestations in the other ten belts either remained static or increased slightly but not to the point of causing dieback (dieback described under METHODS). The average infestation severity rating over all belts has increased only slightly from 1.9 in 1984, to 2.0 in 1985, to 2.1 in 1986, still a rating indicating only 25-75% terminal infestations over the whole belt.

The average number of living bushes has declined since 1984 by 9 bushes per belt. However, only a few of these were being attributed directly to the aphids. The rest were associated with high water, animal damage, mechanical damage or some other known problem.

At the same time the average number of plants infested has gone up about 8% each year. However, the increase does not hold true for all belts individually. Some belts, especially in drier areas like Mobridge, appear to have become lightly infested in 1984 and have not yet seen the infestation increase. Others, like Codington 2, have seen the infestation severity go from 2% to 85%.

DISCUSSION

The honeysuckle aphid has now spread throughout most of South Dakota. The three remaining "uninfested" counties have never

planted that much honeysuckle. Most of what can be found is either wild along river bottoms or is used as ornamentals. Even with the scarcity of host plants the aphids should eventually infest the remaining counties.

Whether or not the aphid will end up killing those plants it does infest in South Dakota's climate is still unknown. The damage evaluation plots, measured over the last 3 years, provide a partial answer. One fear, that the aphid would end up wiping out existing honeysuckle rows in shelterbelts, does not yet seem to be occurring. As can be seen from the yearly averages the infestation amount and severity have continued increasing ever since the start of the evaluation. Severity is only increasing very slowly from 1.9 in 1984 to 2.1 in 1986, out of a rating system which goes from 1 at the least to 9 at the severest. A rating of 2 only means that most of the bushes have between 25 and 75% of their terminals infested but there is no severe dieback or mortality. In fact, the average height has increased each year.

When the data is looked at by individual belts, no overall pattern can be found. In some respects it even becomes confusing. While no belt has yet to lose height there are four which haven't grown, Codington 2, the two in Campbell county, and the one in Hyde. While Codington 2 and those in Campbell county are over 20 years of age and not really expected to put on much more height, the one in Hyde county is only 4 years old and should be growing rapidly. This may be more data indicating the aphid will have its greatest impact on younger (less than 5 years old) belts.

Another pattern which is evident is the increase in average percent infestation. Since 1984 there has been a 16.6% increase in the percentage of bushes infested. This simply indicates that once into a belt, unless they are controlled, the infestation intensity will increase over the first few years. Again, however, when looked at as individual belts, there is a wide range of infestation patterns. Infestation intensity actually declined in Yankton and Beadle. The bushes in Beadle county have been trimmed at least once which may or may not account for some of the reduced intensity. At the opposite extreme, instead of declining, the belt Codington 2 went from 2% infested to over 87% infestation, an increase of 85% in two years.

These trends continue to hold up when looking at percent terminal infestation by bush. The averages consistently show more bushes becoming infested. However, there has not been much increase over the last 2 years in numbers of bushes with greater than 25% of their terminals infested. The real increase has occurred at the 1-25% level, bushes which are infested but not heavily.

Finally, there are some bushes dying in most of the belts, an average of 9 per belt. Most of these are dying due to other causes; animals such as mice or rabbits, mechanical damage during cultivation, standing water at low spots, and other causes. Very few bushes which have died have been attributable to the aphids as yet.

At this time only a few conclusions and some suppositions can be made. First, the aphids will undoubtedly spread into every county in the state and probably already have. It's more a matter of time until they are found. Once into a belt the infestation should increase in intensity for at least a few years, badly disfiguring the individual bushes and the entire row. On well established belts dieback and possible mortality will probably not occur during the first three years and the effectiveness of that shrub row will not be decreased (it may even be enhanced as the shrubs are bushier due to the brooming effect). Younger plantings, especially one or two years old, although not in this evaluation, are known to be killed. The one very young belt in this evaluation apparently has been badly damaged after two years of infestation.

Whether or not the aphid will end up killing most of the plants in a belt and reducing or eliminating their effectiveness is yet to be seen. However, it does not seem that mortality will occur as fast as it has been reported from states east of South Dakota.

RECOMMENDATIONS

Pest management recommendations are virtually identical with those made the past two years:

1. Continue to survey those uninfested counties. If the aphid can survive the climate in those 3 counties it will be able to find the hosts. During 1987, one good concerted effort should serve to find aphids in every county in the state.
2. The permanent damage evaluation plots should be monitored for at least one and possibly two more years. Aphid infestation really increased during 1985. If bushes are going to start dying in large numbers, it should occur in 1986 or 1987.
3. Recommend spray programs only at the landowners' request, if the planting is a new one, or if the infestation has been there two or more years and is now fairly severe. Apparently, the effectiveness of established honeysuckle rows is not significantly damaged by the aphid with only 2 years of infestations.

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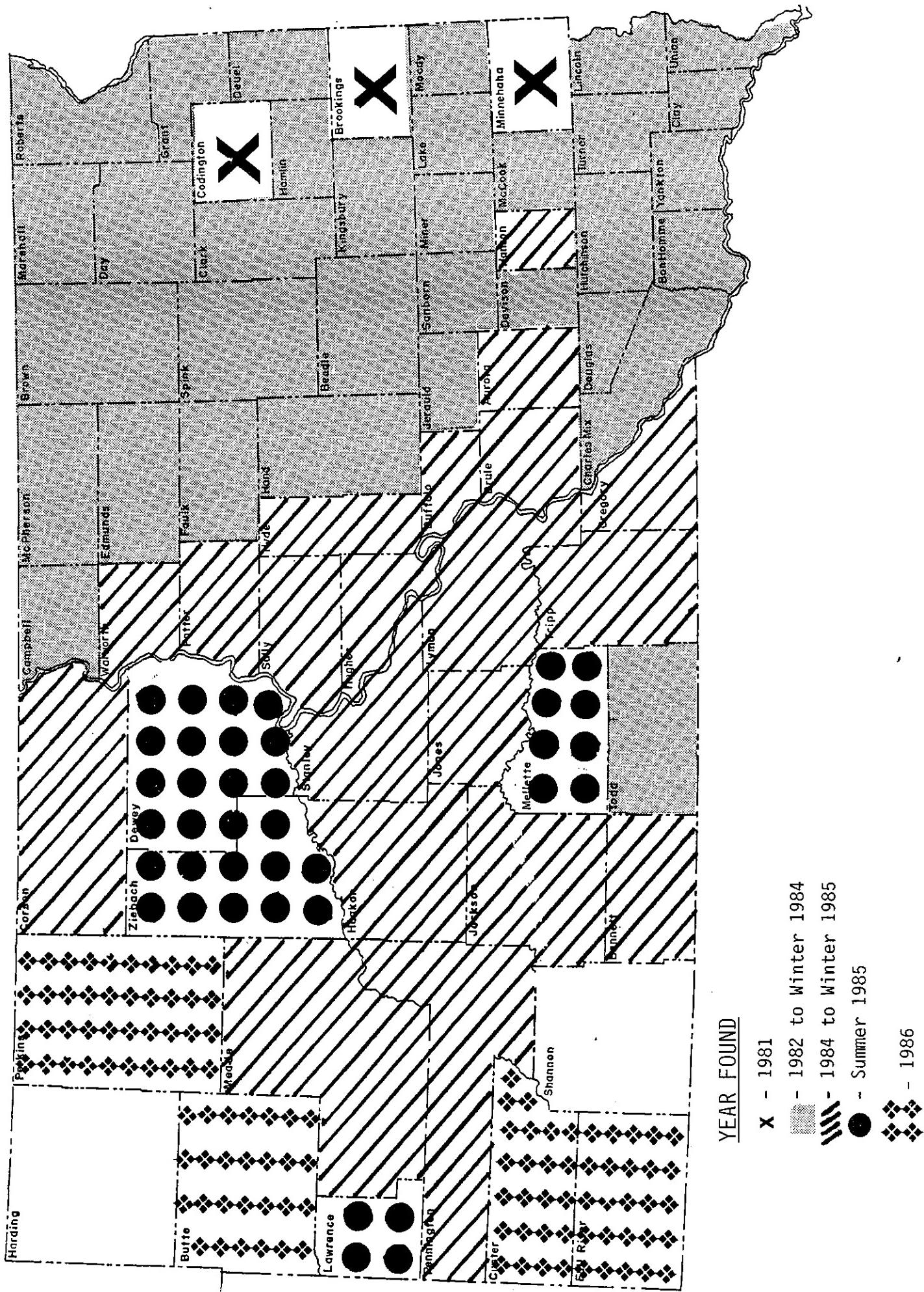


TABLE 1: HONEYSUCKLE APHID DAMAGE PLOT EVALUATIONS--1984 DATA

BELT NUMBER	DISTRICT	COUNTY	BELT INFORMATION			TOTAL BUSHES			NO. BUSHES WITH % INFESTATION OF			
			AGE (yrs)	HEIGHT CLASS (ft)	LIVING (#)	INFESTED (#)	INFESTED (%)	0%	1-25%	25-75%	>75%	(NUMBER)
1	SIOUX FALLS	MINNEHAHA	4	6.0	2	168	131	78.0%	37	32	69	30
2	YANKTON	DOUGLASS 1	2	5.5	3	82	62	75.6%	20	5	0	57
3	YANKTON	DOUGLASS 2	10	7.5	2	97	19	19.6%	78	17	2	0
4	YANKTON	YANKTON	4	6.5	3	236	236	100.0%	0	55	46	135
5	ABERDEEN	BROWN	6	6.5	2	256	152	59.4%	104	109	38	5
6	WATERTOWN	CODINGTON 1	14	6.0	3	21	21	100.0%	0	0	14	7
7	WATERTOWN	CODINGTON 2	23	7.5	1	181	3	1.7%	178	2	1	0
8	HURON	BEADLE	3	5.5	2	206	180	87.4%	26	54	105	21
9	CHAMBERLAIN	TODD	18	6.5	1	178	4	2.2%	174	4	0	0
10	MOBRIDGE	CAMPBELL 1	21	7.0	1	110	2	1.8%	108	2	0	0
11	MOBRIDGE	CAMPBELL 2	21	6.0	1	143	2	1.4%	141	2	0	0
	AVERAGE		11.5	6.4	1.9	153	74	48.4%	79	26	25	23

TABLE 2: HONEYSUCKLE APHID DAMAGE PLOT EVALUATIONS--1985 DATA

BELT NUMBER	DISTRICT	COUNTY	BELT INFORMATION			TOTAL BUSHES			NO. BUSHES WITH % INFESTATION OF			
			AGE (yrs)	HEIGHT CLASS (ft)	LIVING (#)	INFESTED (#)	INFESTED (%)	0%	1-25%	25-75%	>75%	(NUMBER)
1	SIOUX FALLS	MINNEHAHA	5	6.5	3	168	140	83.3%	28	15	51	74
2	YANKTON	DOUGLASS 1	3	6.0	3	92	73	79.3%	19	0	73	0
3	YANKTON	DOUGLASS 2	11	8.0	2	108	60	55.6%	48	0	60	0
4	YANKTON	YANKTON	5	7.0	3	229	176	76.9%	53	0	176	0
5	ABERDEEN	BROWN	7	7.0	2	256	190	74.2%	66	114	71	5
6	WATERTOWN	CODINGTON 1	15	6.5	3	21	21	100.0%	0	0	0	21
7	WATERTOWN	CODINGTON 2	24	7.5	1	181	22	12.2%	159	22	0	0
8	HURON	BEADLE	4	5.5	2	206	161	78.2%	45	61	89	11
9	CHAMBERLAIN	TODD	19	7.0	1	174	10	5.7%	164	10	0	0
10	MOBRIDGE	CAMPBELL 1	22	7.0	1	110	36	32.7%	74	33	3	0
11	MOBRIDGE	CAMPBELL 2	22	6.0	1	141	23	16.3%	118	22	1	0
12	PIERRE	HYDE	2	3.0	3	130	102	78.5%	28	18	24	60
13	RAPID CITY	MEADE	25	10.0	1	93	28	30.1%	65	28	0	0
	AVERAGE		12.6	6.7	2.0	147	80	54.6%	67	25	42	13

TABLE 3: HONEYSUCKLE APHID DAMAGE PLOT EVALUATIONS--1986 DATA

BELT NUMBER	DISTRICT	COUNTY	BELT INFORMATION			TOTAL BUSHES			NO. BUSHES WITH % INFESTATION OF			
			AGE (yrs)	HEIGHT CLASS (ft)	LIVING (#)	INFESTED (#)	INFESTED (%)	0%	1-25%	25-75%	>75%	(NUMBER)
1	SIOUX FALLS	MINNEHAHA	6	7.5	4	158	147	93.0%	11	73	55	19
2	YANKTON	DOUGLASS 1	not measured in 1986									
3	YANKTON	DOUGLASS 2	not measured in 1986									
4	YANKTON	YANKTON	6	7.0	2	231	188	81.4%	43	81	86	21
5	ABERDEEN	BROWN	8	7.0	3	255	198	77.6%	57	74	84	40
6	WATERTOWN	CODINGTON 1	16	6.5	3	17	17	100.0%	0	0	3	14
7	WATERTOWN	CODINGTON 2	25	7.5	2	140	122	87.1%	18	89	33	0
8	HURON	BEADLE	5	6.0	3	203	175	86.2%	28	31	43	101
9	CHAMBERLAIN	TODD	20	7.5	1	162	14	8.6%	148	14	0	0
10	MOBRIDGE	CAMPBELL 1	23	7.0	1	110	38	34.5%	72	32	6	0
11	MOBRIDGE	CAMPBELL 2	23	6.0	1	140	23	16.4%	117	22	1	0
12	PIERRE	HYDE	3	3.0	2	120	96	80.0%	24	28	14	54
13	RAPID CITY	MEADE	26	11.0	1	94	36	38.3%	58	35	1	0
AVERAGE			14.6	6.9	2.1	148	96	64.7%	52	44	30	23

TABLE 4: HONEYSUCKLE APHID DAMAGE PLOT EVALUATIONS
1986 MINUS 1985 COMPARISON

BELT NUMBER	DISTRICT	COUNTY	BELT INFORMATION			TOTAL BUSHES			NO. BUSHES WITH % INFESTATION OF			
			AGE (yrs)	HEIGHT CLASS (ft)	LIVING (#)	INFESTED (#)	INFESTED (%)	0%	1-25%	25-75%	>75%	(NUMBER)
1	SIOUX FALLS	MINNEHAHA	1	1	1	-10	7	9.7%	-17	58	4	-55
2	YANKTON	DOUGLASS 1	not measured in 1986									
3	YANKTON	DOUGLASS 2	not measured in 1986									
4	YANKTON	YANKTON	1	0	-1	2	12	4.5%	-10	81	-90	21
5	ABERDEEN	BROWN	1	0	1	-1	8	3.4%	-9	-40	13	35
6	WATERTOWN	CODINGTON 1	1	0	0	-4	-4	0.0%	0	0	3	-7
7	WATERTOWN	CODINGTON 2	1	0	1	-41	100	75.0%	-141	67	33	0
8	HURON	BEADLE	1	0.5	1	-3	14	8.1%	-17	-30	-46	90
9	CHAMBERLAIN	TODD	1	0.5	0	-12	4	2.9%	-16	4	0	0
10	MOBRIDGE	CAMPBELL 1	1	0	0	0	2	1.8%	-2	-1	3	0
11	MOBRIDGE	CAMPBELL 2	1	0	0	-1	0	0.1%	-1	0	0	0
12	PIERRE	HYDE	1	0	-1	-10	-6	1.5%	-4	10	-10	-6
13	RAPID CITY	MEADE	1	1	0	1	8	8.2%	-7	7	1	0
AVERAGE			0.2	0.3	-8	16	11.7%	-24	15	-9	9	

NOTE: A POSITIVE NUMBER INDICATES A GAIN FROM 1985 TO 1986
A NEGATIVE NUMBER INDICATES A LOSS FROM 1985 TO 1986

TABLE 5: HONEYSUCKLE APHID DAMAGE PLOT EVALUATIONS
1986 MINUS 1984 COMPARISON

BELT NUMBER	DISTRICT	COUNTY	BELT INFORMATION			TOTAL BUSHES			NO. BUSHES WITH % INFESTATION OF			
			AGE (yrs)	HEIGHT CLASS (ft)	LIVING (#)	INFESTED (#)	INFESTED (%)	0%	1-25%	25-75%	>75%	(NUMBER)
1	SIOUX FALLS	MINNEHAHA	2	1.5	2	-10	16	15.1%	-26	41	-14	-11
2	YANKTON	DOUGLASS 1	not measured in 1986									
3	YANKTON	DOUGLASS 2	not measured in 1986									
4	YANKTON	YANKTON	2	0.5	-1	-5	-48	-18.6%	43	26	40	-114
5	ABERDEEN	BROWN	2	0.5	1	-1	46	18.3%	-47	-35	46	35
6	WATERTOWN	CODINGTON 1	2	0.5	0	-4	-4	0.0%	0	0	-11	7
7	WATERTOWN	CODINGTON 2	2	0	1	-41	119	85.5%	-160	87	32	0
8	HURON	BEADLE	2	0.5	1	-3	-5	-1.2%	2	-23	-62	80
9	CHAMBERLAIN	TODD	2	1	0	-16	10	6.4%	-26	10	0	0
10	MOBRIDGE	CAMPBELL 1	2	0	0	0	36	32.7%	-36	30	6	0
11	MOBRIDGE	CAMPBELL 2	2	0	0	-3	21	15.0%	-24	20	1	0
12	PIERRE	HYDE	not available in 1984									
13	RAPID CITY	MEADE	not available in 1984									
AVERAGE			0.5	0.4	-9	21	17.0%	-30	17	4	-0	

NOTE: A POSITIVE NUMBER INDICATES A GAIN FROM 1984 TO 1986
A NEGATIVE NUMBER INDICATES A LOSS FROM 1984 TO 1986

TABLE 6: HONEYSUCKLE APHID DAMAGE PLOT EVALUATIONS
THREE YEAR AVERAGE COMPARISONS

YEAR	BELT INFORMATION			TOTAL BUSHES			NO. BUSHES WITH % INFESTATION OF			
	AGE (yrs)	HEIGHT CLASS (ft)	LIVING (#)	INFESTED (#)	INFESTED (%)	0%	1-25%	25-75%	>75%	(NUMBER)
1984	11.5	6.4	1.9	152.5	73.8	48.4%	78.7	25.6	25.0	23.2
1985	12.6	6.7	2.0	146.8	80.2	54.6%	66.7	24.8	42.2	13.2
1986	14.6	6.9	2.1	148.2	95.8	64.7%	52.4	43.5	29.6	22.6